Wang Zhenhao

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EDUCATION

Shandong University — Shandong, China

Bachelor of Science in Statistics — 09/2022 – 06/2026

Core Modules

- Deep Learning – Machine Learning – Python Programming and and Linux Fundamentals – Advanced Algbra – Probability Theory – Fudamentals of Stochastic Processes – Computer Vision

Field of study: Statistics **Final grade:** 87.47/100

PUBLICATIONS

Zhang, C., **Wang, Z.**, Lv, C., Cui, Y., Jiang, B., & Guo, Q. (2024). **Integrating Social Value Orientation and Motion Safety Controller in Autonomous Driving: Improving the Safety of Unprotected Left-Turn Behaviour.** In *2024 IEEE 27th International Conference on Intelligent Transportation Systems (ITSC)* (pp. 2338–2345). IEEE. https://doi.org/10.1109/ITSC58415.2024.10920185

Zhang, C., **Wang, Z.**, Wang, J., Su, K., Lv, Q., Jiang, B., Hao, K., Wang, W. (in review). **Generative Modeling of Adversarial Lane-Change Scenario.** arXiv. https://doi.org/10.48550/arXiv.2503.12055

(Co-first Author)

Zhang, C., **Wang, Z.**, Likaizheng, Y., Lin, H., Bin, J., Qiang, G. (in review). **PCASim: Promptable Closed-loop Adversarial Simulation for Urban Traffic Environment.** Proceedings of the 2025 Conference on Robot Learning (CoRL, 2025), Seoul, Korea.

(Co-first Author)

RESEARCH EXPERIENCE

Deep Reinforcement Learning Autonomous Driving Research Group

Supervisors: Jiang Bin, Senior Chuan Cheng — Shandong University

06/2024 – CURRENT

- Cleaned and refined NGSIM and INTERACTION datasets by removing irrelevant data (pedestrians, motorcycles, trucks) and extracting vehicle-following and lane-change data for scene generation.
- Enhanced PPO model by introducing attention mechanisms, relaxing clipping ratios, implementing reset mechanisms with Replay Buffer, and improving learning efficiency.
- Developed adversarial reward functions considering vehicle dynamics and integrated SVO to balance confrontation with social considerations.
- Replaced KL divergence with W-Distance to improve the naturalness of scene generation.
- Created a new evaluation metric combining collision rates, safety distances, acceleration stability, and trajectory rationality for assessing scene criticality and danger.

10/2023 – 04/2024

- Researched reinforcement learning and focused on modifying trajectory planning for autonomous vehicles in complex scenarios.
- Developed skills in writing academic papers, particularly introductions, related works, and methodologies.
- Designed and adjusted the reward function to address decision hesitation and incorporate SVO for safer vehicle behavior.

- Achieved improved collision rates and vehicle speeds compared to baseline models.

Research on soybean pest and disease target detection method based on UAV aerial images 12/2023 – 03/2025

Supervisor: He Hong Shandong University

- Annotated over 1,500 images of soybean leaves affected by pests and diseases using LabelImg.
- Trained the Salience-DETR model and performed a comparative analysis with the YOLOv11 model.

Fruit price factor fluctuation prediction based on deep learning 12/2023 – 12/2024

Supervisor: Bo Yude Shandong University

- Collected and organized data pertinent to mango pricing.
- Utilized Random Forest and CNN-LSTM models to predict mango prices.
- Identified and ranked key factors influencing mango prices.

Medical Question-Answering Agent and Automatic Registration System Development 05/2024 – 09/2024

Shandong University

- Developed an intelligent agent for doctor consultations with near-perfect diagnosis accuracy.
- Automated appointment booking for offline consultation services at hospital, boosting efficiency by 50% and improving user experience.
- Led system optimization, solving technical challenges and enhancing performance.
- Fine-tuned Wenxin Yiyan in order to make it more accurate and profession in terms of medical questioning.
- Utilized *Numpy Library* to reproduce picoGPT locally.
- Implemented local intelligent Q&A and registration processes.

Journal Literature Retrieval and Visualisation Website Development 10/2023 – 03/2024

Shandong University

- Exported and cleaned journal data from Web of Science to ensure data integrity for analysis.
- Used LDA and BERTopic models for topic modeling and automatic classification.
- Designed website prototype, developed front-end and back-end, and integrated topic modeling functions.
- Optimized retrieval efficiency by 30%, enhancing user experience.
- Project was well-received by teachers and students but became inaccessible after a three-month server rental expired.

Special Star Search Based on Photometric Images 06/2023 – 06/2024

Supervisor: Bo Yude Shandong University

- Conducted data enhancement for improved model performance.
- Trained YOLO series models for object detection tasks.
- Authored all experimental content in the research report.
- Secured the second prize at the university level for the project.
- Successfully completed and submitted a comprehensive research report paper.

Design and development of an intelligent cat feeding machine 12/2022 – 10/2023

Shandong University

- Replaced the original cat face recognition model with YOLO, achieving 98% accuracy and resolving instability issues.
- Integrated the recognition algorithm into the Orange Pi and developed a Python script for automated feeding, ensuring over 85% stable operation.

- Created 3D models of the cat feeder using Solidworks, enhancing stability and user experience.
- Contributed to project documentation and videos for open-source sharing.
- Successfully designed and produced a functional cat feeder costing over 3,000 yuan, powered by solar panels.

Exploring the impact of the mother tongue (Chinese) and third language (Japanese) on the second language (English) speech comprehensibility 12/2024 – CURRENT

Supervisors: Sun Tiafeng, Liu Qian Shandong University

- Analyzed results to extract insights and additional information.
- Developed mathematical models based on the provided data.
- Offered recommendations to guide the team's research direction and focus.

WORK EXPERIENCE

Autonomous Driving R&D Intern 11/2024 – 03/2025

- Cleaned and processed public datasets (NGSIM, INTERACTION), mined and enhanced data using feature recognition algorithms to identify challenging traffic scenarios, built adversarial training datasets for imitation and reinforcement learning, and successfully trained vehicle models to improve safety decisions; demonstrated strong problem-solving and self-learning skills recognized by the team.

ACTIVITIES

Winter Vacation Social Practice 06/2024 – 12/2024

- Conducted research on privacy challenges in the digital age, focusing on data abuse and personal security.
- Performed modeling and analysis to inform policy recommendations for protecting citizens' rights.
- Achieved Third Prize at the College Level for contributions to the project.

The 13th "Youth" Ideological and Political Course Teaching Competition 03/2024 – 05/2024

- Completed recitation on the theme of "My Motherland" and cooperated with the preparation of event.
- Achieved First Prize at the university level for participation.

The 10th "Perfect Campus" Proposal Competition of Shandong University 03/2024 – 05/2024

- Presented the proposal on the improvement of campus sports venue fees.
- Achieved Third Prize at the College Level for participation.

"One Million College Students Entering the Community" High-tech Zone Community Practice Project 01/2024 – 04/2024

- Led a team of 14 people to carry out a 159-day practical activity in Yihaiyuan Community, planning and organizing programming, 3D printing, fun games and art creation activities, with more than 60 children participating.

INTERESTS

- Passionate about sports, including running, cycling, and table tennis.
- Multi-talented with a focus on maintaining an active and healthy lifestyle.
- Enthusiastic about embracing life, maintaining a positive and resilient mindset.
- Committed to continuous learning and personal development.

HONOURS AND AWARDS

Grand Prize in "Challenge Cup" National Science and Technology College of Extra-curricular Academic Competition Works Shandong University 04/2025

First Prize in National Undergraduate Mathematical Modeling Contest Shandong Province 11/2024

Outstanding Student Leader Shandong University 10/2024

Third Scholarship for Outstanding Students Shandong University 10/2024

Speciality Scholarship Shandong University 10/2024

Third Scholarship for Outstanding Students Shandong University 10/2023

Second Prize in ASC Student Supercomputer Challenge ASC Intelligent Computing 04/2024

Third Prize at the Provincial Level in MathorCup 04/2024

Second Prize at the Shandong Science and Technology Innovation Competition 03/2024

Third Prize at the 9th China International College Students' "Internet +" Innovation and Entrepreneurship Competition – Industry Proposition Track Shandong University 11/2023

DIGITAL SKILLS

- Deep reinforcement learning
- Matlab
- Solidworks
- Carla
- LLM Fine-tuning
- Arduino